1 May 1969

Nick,

I have thoroughly reviewed this paper. It is quite well written and in general it does answer the questions directed to us by [redacted] concerning our FY-71 R&D budget presentation. The task was given to [redacted] and, generally speaking, I think they have done a commendable job with the exception of the two obvious plugs for PPS,--probably understandable under the circumstances. The only valid criticism would be that some of the answers may prove to be somewhat too technical and thus create additional questions. However, there is nothing in the memo that should cause us problems and their writing has spared us a considerable task. Major portions of this memo were coordinated with us while still in draft form and my recommendations for changes have been incorporated in the final version. It is my recommendation that no additional action is required at this time.

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NPIC/TSSG/PPS-63-69

MEMORANDUM FOR: Executive Director, NPIC

SUBJECT: NPIC Fiscal 71 R&D

25X1 REFERENCE: Same Subject, [redacted] Dated 28 January 1969

1. In response to your referenced memorandum I am now able to review some of the questions contained therein. First, I would like to comment on your first paragraph which contains a summary statement to the effect that "all of us in the Center are in general agreement as to the thrust of these paragraphs." Provided there is a considerable degree of freedom in the term "general agreement" I believe your assumption is accurate. However, I would like to caution you concerning the tenuous nature of the Fiscal 70 and 71 R&D programs as they were prepared and submitted by [redacted] These programs were compiled with a great deal of haste in order to gain certain tactical advantages at Headquarters. I would remind you of a statement in this regard that [redacted] made in his notes on the R&D program. Paragraph 2, page 27 indicated his intention to completely recast the Fiscal 70 list. Due to the interruptions and redirection of our R&D effort caused by [redacted] departure and the advent of [redacted] on the scene I would not be surprised if there are a number of fairly significant changes over the present course mapped out for the Fiscal 70 and 71 programs. Some of these changes will be related to Nick's own unique approach to the problem--others will come from plans subsequently conceived by virtue of our Image Analysis Program Study, the R&D Planning Conference at ISOL, [redacted] With this introduction I will proceed to answer the questions in the remainder of your memorandum and indicate those areas where answers are not yet available.

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2. AUTOMATIC TARGET RECOGNITION (Paragraph 3 of the reference). The Fiscal 71 (July 1970) schedule for starting production of the cloud screener is based on our best judgement of the time required for development and test and evaluation of the prototype. Since this is a frontier type development we anticipate a rather extensive debugging phase before it will be practical to establish the production model design criteria. As you assumed, the funds programmed in FY 69 also cover the development work for Fiscal 70. This is a 16 month program so it will provide us opportunity to get up on the step by letting the FY 71 contract early in the year. Our situation, as far as the capacity to accelerate the development is concerned, is not yet well enough stabilized to provide you with a specific recommendation in that regard. I have advised

25X1 [redacted] of your interest in this matter and we should be able to give you a specific recommendation within 3 months. I am not sure what you mean in your request concerning the realistic "aspect of state-of-the-art work in ATR." If you are referring to the technological frontier in such areas as laser technology and information handling theory I can assure you that the breadth of our awareness and evaluation in this area is improving through the increased coordination and communication achieved between our technical divisions--largely through the efforts of our Projects and Programs Staff. Decisions regarding the specific interpretation processes for which ATR support will be developed are being carefully coordinated with IEG. This has always been the intent of this program. However, once a certain line of development has proceeded for some time it may be impractical to change it in spite of the fact that the nature of the support requirement has changed. Generally speaking, I believe we can establish that all of the development work that we contemplate in this area is significantly beneficial to our exploitation processes. These benefits will be direct or indirect depending upon the ultimate match between the line of development and the exploitation operations at the time the development has become an operational reality. The long lead lines involving 3-4 years complicate this process.

3. SILVER AND NON-SILVER PROCESSES (Paragraph 4 of the reference).

25X1 We have been right on top of the [redacted] work in this area. Our latest information comes from an independent evaluation obtained from [redacted] of the National Bureau of Standards who visited [redacted] in company with [redacted] from the Exploratory [redacted] the contract monitor, and [redacted] briefed a number of my technical people concerning his opinion of the status of the [redacted] development. The major points of his briefing are as follows:

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a. The sensitometry (ability to render various levels of density) of the [redacted] material will probably meet our objectives and thereby definitely become competitive with the conventional wet silver halide process.

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b. The resolution of this material is so high (probably in excess of a thousand lines per millimeter) that [redacted] has not yet developed a means to accurately measure it. The resolution performance of the material will doubtless exceed that of the conventional silver halide process.

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c. [redacted] has a major problem in developing a plastic polyester base to support their photo-sensitive emulsion. At this point they are not able to purchase base material from other manufacturers such as [redacted] for a number of reasons. If [redacted] must indeed develop their own capability to produce their own satisfactory material it will probably be at least two years before they are able to do so in production quantities.

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In response to [redacted] judgement on this matter we are looking into some ways of circumventing the delays that will ensue from the requirement for [redacted] to produce their own base material. It is possible we may be able to get around the problem of procuring it from [redacted] If we can not we may be able to stimulate more effort on [redacted] part to get the job done in a shorter time frame. In the meantime our Projects and Programs Staff has accomplished an initial effort in compiling a plan for the development and implementation of this material and the equipment required to efficiently utilize it within the Center operations. This plan is currently being distributed to appropriate Center components for evaluation and feedback. Again, by the end of this Fiscal Year we should be able to tell you whether or not we would make significant gains in time by intensifying our investment in this development.

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4. AUTOMATIC MATERIALS TRANSPORT ("AUTOMATIC TRANSPORT MATERIALS") (Paragraph 5 of the reference). I believe there is a misunderstanding about the title of this category in the reference. For that reason I have indicated our title and yours parenthetically in quotes. The [redacted] we have planned against this category for Fiscal Year 70 is still addressed primarily to a study of the problem and appropriate system design. I know this sounds somewhat discouraging in light of the late date and the amount of work that will have been carried on in-house by that time. If specific pieces of equipment are recommended and approved for development from the in-house studies some of these funds could be so earmarked. However, the in-house studies will not be likely to give us a comprehensive picture of the solution other organizations have developed for similar materials handling problems. This information is typically available to industries specializing in this area since they have staffs whose sole function is to gather it. Also, I doubt that our in-house studies will contain much information about new technical development which may be very appropriate to our in-house problems. In addition to this our studies would buy some detailed conceptual designs which is important information required for the evaluation of a hypothetical system. I doubt that we could gain anything by attempting to go into hardware development before this study phase is completed. We feel we have a much better handle on the Chip Storage and Retrieval problem and would actually be able to solicit a meaningful proposal in this area in Fiscal 69 if you wish to speed up this development in that fashion. However, I don't believe we should enter into any significant hardware development until this program, system, and project definition phase has been completed.

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5. ADP ADVANCES (Paragraph 6 of the reference). We do not have a specific item of this variety in our budget because the responsibility of management of research and development in ADP is not clearly defined and previous attempts on the part of TSSG to include it (under the title of Information Handling) have not been approved. Currently some research and development in this area is implicit in the Chip System development, Automatic Materials Transport, Chip Storage and Retrieval, and Collateral

Support System projects. We want to resolve this matter with your office in the near future, in which case some redistribution of funds may be required in order to provide for specific allocation for this category.

6. TEST & EVALUATION (Paragraph 7 of the reference). We have conducted a study of the Commo and TSD requirements for testing unique specialized equipment. Their T&E procedures are well-established but not directly analogous to ours. First, the majority of our equipment involves high performance optics for which testing equipment and procedures are not as well standardized as they are for electronics--the primary technology involved in Commo and TSD equipment, and second, they are more adequately staffed and outfitted for the T&E of their equipment. Consequently there is relatively little requirement for T&E support in their R&D budget.

7. AUTOMATIC DODGING (Paragraph 8 of the reference). We have previously attempted to develop new techniques for utilizing principles of automatic dodging. A special P.I. Viewer was developed with [redacted] and has received fairly extensive evaluation. The [redacted] has attempted to develop high performance automatic dodging printers at [redacted]. At this point they have failed to accomplish high resolution simultaneously with the automatic dodging feature. The delay in attempting further development in this area is due to our lack of definition of its benefits. Favorable subjective judgements of the improvements in image viewing are fairly prevalent in the case of dodged photographic prints (which are relatively low resolution). However, as yet even in this case we have no quantifiable evidence for the operational significance of this improvement. This dilemma points back to the purpose of our Imagery Interpretation Research program and falls under the general area of the requirement for the definition of image properties and how they affect image perceptibility. If we can isolate an area where automatic dodging may provide intrinsic benefits for the exploitation process on the basis of usable quantitative evidence, we will certainly proceed to develop it. However, we know of no such area at the moment so the funding is programmed for Fiscal 71, at which time we hope to have enough answers to our questions about image perceptibility to properly define performance criteria for development of automatic dodging equipment.

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material.

9. STEREOGRAMS (Paragraph 10 of the reference). I believe most of your questions concerning the stereograms have already been answered. Some of the interpreters in both IEG and IAS still use stereograms--particularly for third phase read out--but their use is not as extensive as in former years. One of the reasons for this is that the geometric distortions in some of the mission materials (particularly [redacted] in the oblique mode) 25X1 preclude a fixed spatial relationship for stereo-viewing all of the image areas in the stereo-pairs. It is my understanding that the [redacted] stereo- 25X1 gram maker you referred to is actually a system for producing orthophotographs which are photographs having the relief displacement removed from them--and strangely enough this is accomplished under the automatic control of a stereo plotter.

10. APPLICATION OF USEFUL DATA FROM IMAGERY INTERPRETATION RESEARCH STUDIES (Paragraph 11 of the reference). We regard the problem of utilizing this data as being two-fold. It is first a problem of communication and second a problem of executive direction. We accept the responsibility for communicating this information through liaison, briefings, and correspondence to you, PPBS, the other groups in the Center, and other appropriate Center elements. [redacted] has been working together with [redacted] to establish 25X1 some specific procedures which we believe will help to assure that this information is carefully and accurately communicated. In some instances there will doubtless be differences of opinion regarding the degree of benefit and/or the appropriate time for implementing the changes indicated by the data. This is where the executive direction will be required. 25X1 25X1

[redacted]

Chief, Technical Services and Support Group, NPIC

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